

Applied Research Highlights DDFA FY 2002 Midyear Review

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Product Manager**

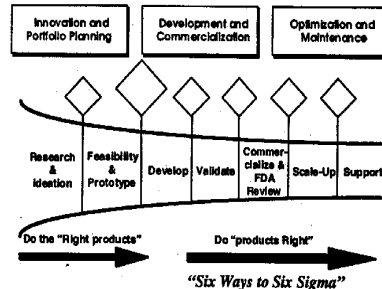
**National Energy Technology Laboratory
March 5, 2002**



New Product Development SeminarSM

New Product Development Processes

BAXTER Health Care I.V. Group's NPD Process Product Development Phases



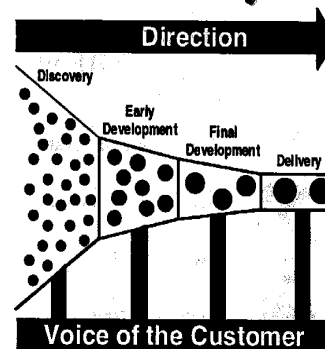
XEROX Product Development Phases

Pre-concept
Concept
Design
Demonstration
Production
Launch
Maintenance

Exxon Chemicals' Polymers Phases

Idea
Preliminary assessment
Detailed assessment
Development
Validation
Commercial Launch
Post launch review

Inland Container's Innovation System



Technology Development Stages

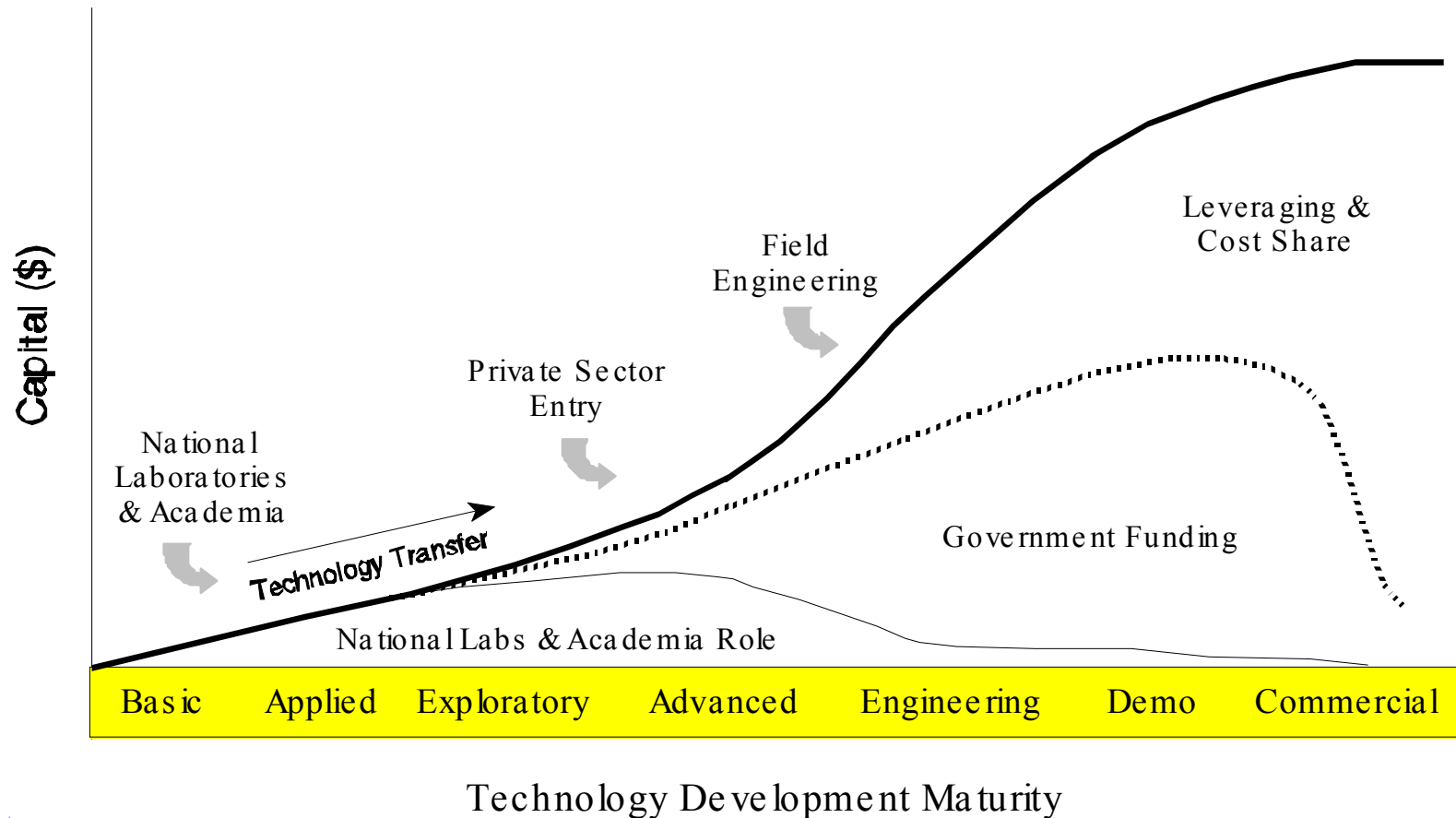
Technology Maturation Stages	Basic Research	Applied Research	Exploratory Development	Advanced Development	Engineering Development	Demonstration	Implementation
	Idea Generation No Need	Need	Proof of Product Definition • Non-specific applications • Bench-scale	Technology Working Model • Reduction to practice • Specific applications • Bench-scale	Engineering Prototype • Scaled-up version to test design features and performance limits • Pilot-scale • Field testing	Production Prototype • End-user validation • Full-scale • "Beta" site testing	Utilization by End-User
Gate Expectations		1 Address priority DOE need Knowledge of similar efforts	2	3 Show clear advantage over available technology	4 Meet cost/benefit requirement Demonstrate significant end-user demand	5 Technology ready for end-user	6 End-User deploys technology
Deliverables Required for Gate Decisions		Correlation with DOE needs Summary of similar work	Performance requirements Comparison of technological alternatives Preliminary market assessment - DOE - Other Identification of issues: - Technical - Programmatic - Market - Regulatory - Public acceptance - Legal - Health & Safety	Product specifications Cost/benefit analysis Detailed market assessment - DOE - Other Public/regulator involvement plan Strategy for: - DOE deployment - Commercialization - Cost-sharing - Regulatory compliance - Licensing Initial performance/cost data package	Demonstration permits Partnership agreements - Cost-sharing - Licensing Resolution of issues Final performance/cost data package	Signed contract with end-user(s) Public acceptance	

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Descriptor - include initials, /org#/date



What is Government's Role in the Technology Development & Commercialization Path?



Requirements for Success

- The technology system must address a priority DOE problem, for which performance requirements are determined
- The technology system must provide a clear advantage for a given application, in terms of cost savings, mortgage reduction and/or risk mitigation, over other potential technological solutions
- The technology system must be acceptable to end-users, regulators and public/tribal stakeholders
- The technology system must be commercially viable for government and/or non-government use, except in cases where one-of-a-kind technology is required



Success Requires

- Time
- Reliable Funding
- Hard Work
- Business Perspective



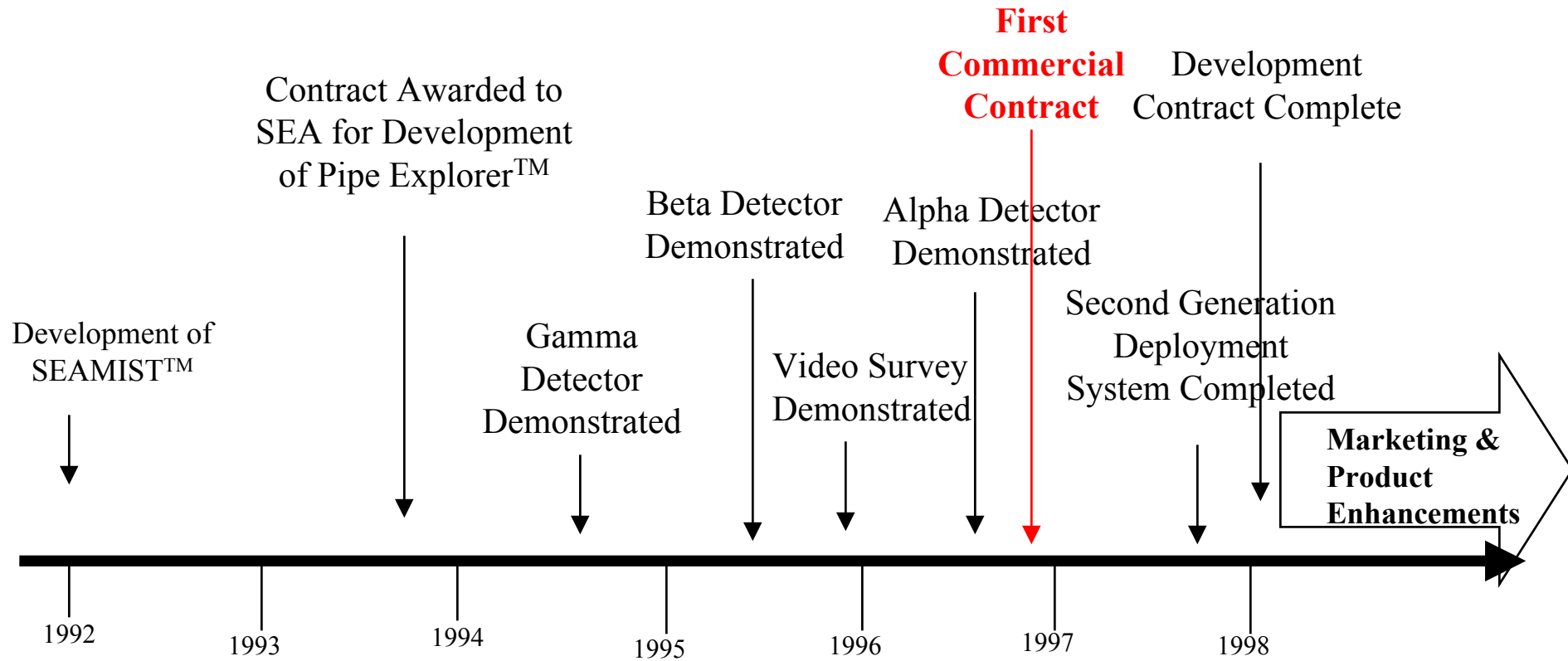
Pipe Explorer™

Science & Engineering Associates, Inc.

- Characterization of Inaccessible Piping - alpha, beta, gamma detection and video surveys
- Deployed over 14 Times
- Documented Cost Savings of over \$5 million.



Development History of Pipe Explorer™



Additional notes for Development history of Pipe Explorer

1



Additional notes for Development history of Pipe Explorer

2



Additional notes for Development history of Pipe Explorer

3



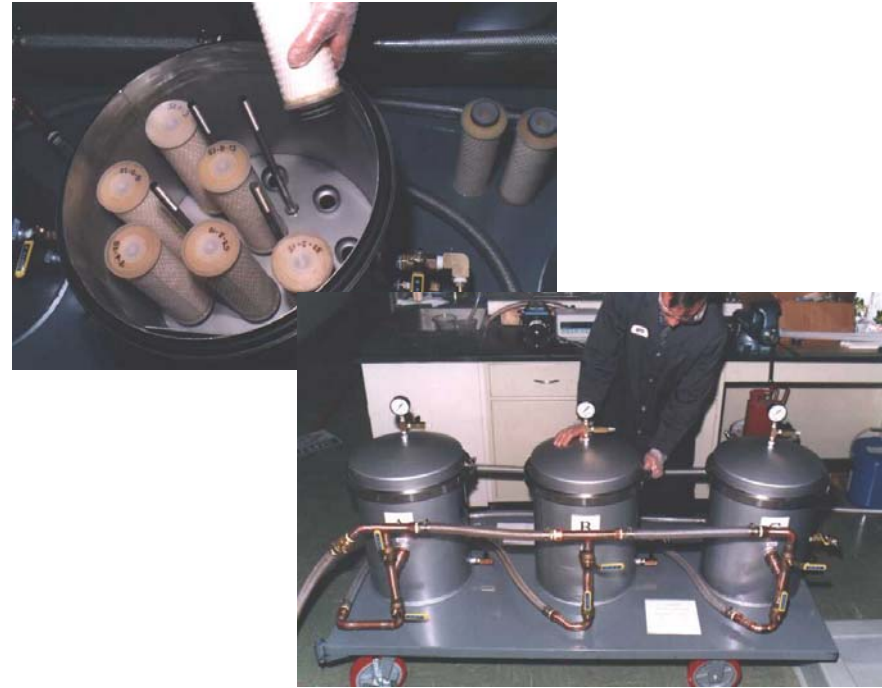
Selective Membranes 3M Corporation

Empore™



Rapid Liquid Sampler

WWL™



Selective Separation Cartridge

Rapid Liquid Sampler 3M Corporation

- A rugged, field-portable sampling and analysis system for radionuclides and metals.
- Based on small solid phase extraction disks known as Rad Disks that are made from 3M's patented Empore™ membrane.
- Commercially available for ^{137}Cs , ^{90}Sr , ^{226}Ra , ^{99}Tc , and Pb.
- Deployed at SRS, BNL, Hanford, and LANL.



Selective Separation Cartridge Technology 3M Corporation

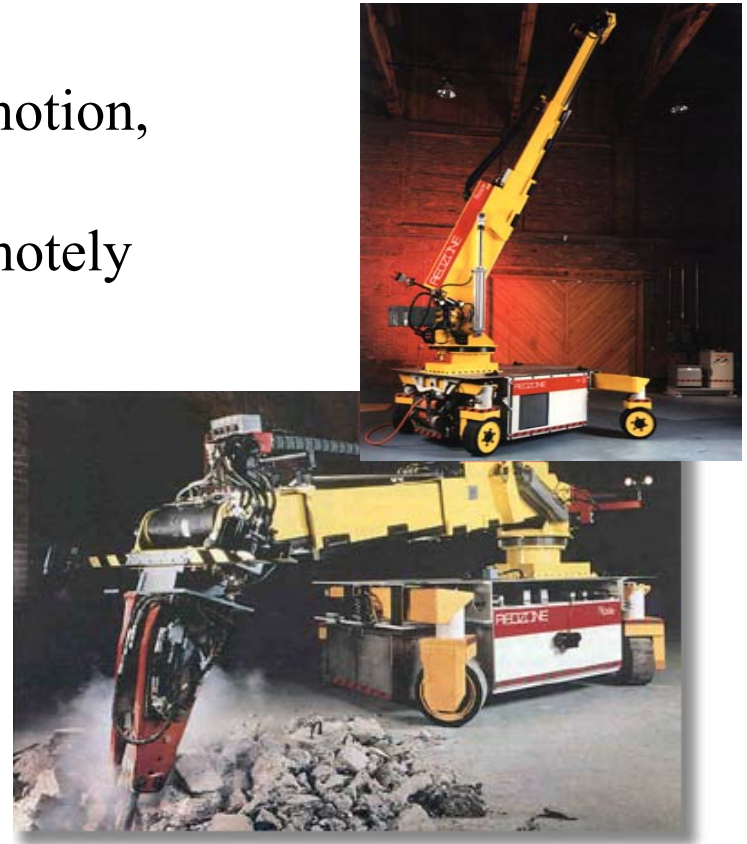
- Selective Separation Cartridge for the Removal of Radionuclides and Metals from Aqueous Waste Streams.
- R&D 100 Award, and top 40 R&D 100 Awards of the Century
- Demonstrated success for ^{137}Cs , ^{90}Sr , ^{226}Ra , ^{99}Tc , ^{60}Co and Pb.
- Deployed at SR, BNL, ANL, and CEMP



Rosie

RedZone Robotics

- Rosie provides all the necessary locomotion, heavy lifting and tooling deployment capabilities to perform D&D tasks remotely
- Worked remotely in radiation field ranging from 0.05 to 2.0 R/hr, reducing worker exposure
- Deployed at CP-5 LSDDP and ORNL



Houdini

RedZone Robotics, Inc.

Houdini can perform waste retrieval, waste mobilization, waste reduction, and other decommissioning tasks.

- When fully deployed, measures approximately 4 feet x 5 feet, but the system can be collapsed to fit through confined entries as small as 22.5 inches in diameter.
- Savings of \$30-50 million at Oak Ridge GAAT Tanks alone



Decontamination and Conversion of Nickel Radioactive Scrap Metal Manufacturing Sciences Corporation

- MSC developed an electrorefining process that is capable of removing radioactive contaminants from Nickel
- August 1997 BNFL awarded a \$238 million dollar contract to decontaminate 3 buildings at ETTP. MSC, a BNFL company, was to decontaminate the nickel and other metals and take ownership of the decontaminated scrap metal and credit DOE over \$55 million dollars.
- Moratorium on free release of radioactively contaminated scrap metal by Richardson in 2000
- Successful technology but no DOE market.



Applied Research Partners

- Universities
- National Laboratories
- Industry



University Applied Research Partners

- Florida International University
- University of Tennessee- Knoxville
- University Research Program in Robotics (URPR)
 - University of Florida
 - University of Michigan
 - University of New Mexico
 - University of Tennessee at Knoxville
 - University of Texas at Austin



Additional notes for University AR participants



National Labs Applied Research Partners

- Oak Ridge National Laboratory



Industry Applied Research Partners

- Science Engineering and Associates, Inc.
- Arm Automation, Inc
- Automatika, Inc.
- Physical Optics Corporation
- Radiation Monitoring Devices., Inc.
- ADA Technologies, Inc.
- YAHSGS LLC
- Aspen Systems, Inc



Additional Industry AR participants notes.



Concluding Remarks

- Universities, National Labs and Industry are all important players in technology development
- Product development requires a dedicated business entity
- DOE market penetration is difficult
- Non-DOE markets are important
- Significant time and effort is required

